7

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The kidneys are incontestably the most important organs.

It is notable that in English there is no other name for them. However, the word loins is sometimes meant for them, although not very appropriately. The French besides the name *reins* have also another one *rognons* mostly used by the common people. It is worthy of notice that the word means truly the belly, the womb, say lexicologists. We then understand the meaning of the expression we sometimes meet in books and novels, to be of the same kidney, meaning of the same kind or origin.

We should remember how small the kidneys are when we consider their very important functions. This is quite in contrast with the liver.

It is to be borne in mind that they occupy about the center of the whole body. In books it is said that the right kidney is lower than the left because of the presence of the liver on the right. Yet it is my experience that the two organs are often on the same line, and that at times the right kidney is somewhat lower.

It is interesting to remember that their long axis is directed vertically like that of the bladder, spleen and lungs, whereas that of the brain is horizontal, of the heart oblique, the liver transverse and the pancreas also.

We should lay stress on the fact that there is no other organ so loosely situated and fixed, except the spleen. It is held in place simply by its large vessels and the peritoneum passing over it. No wonder, therefore, that it is of all the organs the one that is most commonly found floating about or wandering out of its normal position.

We should call attention to the fact that it receives no motion from any adjoining organ. Nor has it any intrinsic mobility. However, it is most remarkable that when held in the hand in an operation or an experiment it will throb like a little heart, so great is its arterial vascularity. The brain is the only other organ that thus throbs, except the heart and arteries, of course.

It is striking that the shape of the kidney is unique and typical. The word reniform is often used to express the shape of an object that looks like a bean.

It is a fact to be noted that the anterior surface of the kidney is rather convex. This is because that surface is free from any pressure. We should admire on that surface the pretty superficial arborescent venous capillaries known as the stars of Verheyn, the like of which is observed nowhere else. We should bear in mind that that surface on the right side is in relation with the liver and ascending colon, but on the left with colon only.

It deserves special mention that the posterior surface is quite in contrast with the anterior. We must note its flatness, due to the fact that it is its resting surface, lying on the square lumbar muscle principally. For that reason, this muscle has been looked upon as the guiding muscle of the kidney, the muscle that all surgeons must have impressed on their mind when they are attacking the kidney from behind, by the extraperitoneal route.

The external border of the kidney is also of special interest to the surgeon. We must note that it is convex and that it corresponds to the external border of the square lumbar muscle, which is the guide to it. It is of importance to note that that border is the safe border of the kidney, the one that is incised when an exploration of the interior of the organ is necessary. All that because it is the furthest from the large vessels.

We must lay particular emphasis on the internal border. To begin with, we must take notice that it is shorter than the external. Besides, it is concave and not convex like the external. Then we are struck by the deep notch it presents in its middle and which constitutes the hilum of the organ, so remarkable along with that of the liver and lung. We must remark that there, as in the liver, the external fibrous coat is reflected into the organ after the manner of the capsule of Glisson. We must lay special weight on the fact that the renal vessels are in the front part of the hilum, whereas the chalices and pelvis occupy the posterior part. This a most fortunate arrangement, because the kidney, chalices, pelvis and ureter can be reached from behind in all safety.

It is worthy of notice that the upper extremity of the kidney is its base; i. e., that it is larger than the other end and that that base is turned upward. In other situations the base is the lower part of the organ, but here it is the reverse. A unique occurrence is that the upper extremity is capped by the supra-renal capsule. No other organ is thus capped or surmounted by another. Perhaps it is to afford a sufficient surface for that supra-renal capsule that the upper extremity of the kidney is harder than the lower. It is notable that the upper extremity is in relation on the right side with the liver. The liver presses so on the kidney that this organ causes a slight depresison on the under surface of the liver. On the left, we must state that there is no such peculiar relation.

Surgeons should have impressed upon their minds that the lower extremity is midway between the last rib and the iliac crest, along the border of the lumbar mass. They should remember that when the right kidney is lower than the left, this extremity on that side is lower.

A special point is that the kidney is dark brown. The liver is the only other structure resembling it. It is of interest to know that the organ is firm, but that it is friable, though not so much so as the liver and the spleen. It is of some importance to bear in mind that it has no elasticity, no retractility.

It is a unique instance that we find the kidneys embedded in such a mass as the adipose capsule presents. We may look in vain for another organ so ensconced in a soft place. Why? Here we must remember the important role that this layer plays in perinephritic abscesses.

The external fibrous coat deserves special mention because of its thinness and yet great resistance. This is such that it can be peeled off the organ. This cannot be done with the liver nor any other organ except the spleen and the testicle. At the hilum we must take notice that it is manifestly visible with the naked eye, penetrating, reflected into the organ as in the liver, forming also a sheath for the blood vessels. But it is worth while to note that it cannot be traced with the eye alone. beyond the center of the organ, the base of the pyramids of Malpighi.

It is most interesting to note that the kidney, upon a section, is found to be composed of two substances. The supra-renal capsules, the thymus and the brain are the only other organs presenting the same peculiarity. One cannot help being struck by the differences in characteristics of the two substances in the kidney. The cortical is yellowish, granular, friable, easily penetrated by the thumb nail, sending the columns of Bertin into the central portion down to the hilum. These columns of Bertin are without a parallel in the human body. The central portion, with its pyramids, is unique; so is their purplish color, their striation and their resistance to the thumb nail. We should note that their base is divided peripheraly. We must also lay stress on the apices of the pyramids, their elegant conical teat-like shape, their penetration into the chalices, their close insertion around the base of the peripheral extremity of the chalices. The kidney is the only organ presenting such a trait.

It is worthy of more than passing notice that the two substances of the kidney, although so different to the naked eye, are composed of the same anatomical element, extremely long canalicules; that they are numerous, closely packed and straight in the pyramids, hence the striated appearance of the tissue and its firmness. The dichotomous divisions of each one of the canalicules from the apex to the base is truly beautiful, thus forming a pyramid of Ferrein, or a lobule specially visible at the base of the pyramids. I cannot remember any other organ where this exists. The mammary glands present dichotomous division, but coarse and nothing like this.

Upon considering the cortical portion admiration still increases. There we must first note the twists, the kinks, the convolutions innumerable of the canalicules, so different from their straight course in the central portion. All for the purpose of increasing the surface of action. The convolutions of the seminiferous canalicules remind us of this arrangement. Then our attention must be arrested by the termination, or, more properly speaking, the beginning of the canalicules by an abrupt dilatation, not a caecal one. This recalls that the sudoriparous glands, beginning by the same kind of dilation, are very much kinked at first like the uriniferous canalicules in the cortical portion, then straighten up as they are in the pyramids of the kidney. The seminiferous canalicules also begin by an abrupt dilatation, not a mere saccule. We must be impressed by the foregoing that the kidney is a compound tubular gland outclassing every other of the same kind. The granular appearance of the cortical substance is due to the dilatation and its friability to the comparative looseness of the kinking.

It is truly a pretty sight, that of the dilatations situated in perpendicular rows on the periphery of the lobules or pyramids of Ferrein along the course of the arteries in the interlobular or inter-Ferreinic spaces so as to readily receive from them their vascular supply. They look like ruddy apples on an overladen tree. The like of this is seen nowhere else.

When on the same slide the arteries, the veins and the canalicules are injected they present a gorgeous rainbow effect, especially in the pyramids portion.

To mention the loop of Henle is to evoke many philosophic reflections. Its dipping, elegant curve is puzzling to the extreme and unique. What is truly the relation of cause and effect?

We must remember here that it is the lining epithelium of the canalicules that form the casts in Bright's disease.

The vascular supply of the kidney is wonderful, considering the small size of the organ. The renal artery is unduly large and the veins are comparatively larger than we find them in any other organ. This great vascularity is understood when we remember the active depurative function of the kidneys. We must note that when the kidneys are on different levels on each side, there is one artery that is higher than the other. The same applies to the veins. But whereas the arteries are of the same length we must consider that the two veins are of irregular length, the left being larger than the right, as it has to cross over the median line to reach the inferior cava vein. It is noteworthy that the veins carry a purer blood than the arteries, on account of the purifying action of the kidneys. We should not pass unnoticed that the left renal vein receives the left spermatic vein, whereas, on the right side, that vein does not discharge in the renal vein, but in the cava.

It is when we consider the arrangement of the capillaries in the kidney that admiration is forced almost as much as in the case of the liver. We must first lay stress on the dome-like division of the smaller branches of the renal artery over the base of the pyramids. Whereas in the liver it is the dipping branches that are the most interesting and beautiful, in the kidney it is the ascending branches which shoot up gracefully between the pyramids of Ferrein in the interlobular spaces of the surface of the organ. It is a most exquisite sight to see the little arterial branches given off to each capsule. It is remarkable that they enter the capsule at a point opposite to that of the penetration or dilation of the canalicule. It many times repays the time and trouble to seek a favorable slide that will show that little capillary in the capsule and to see that it does not coil in it at once, but first divides into several small branches, each of which coil separately, the whole forming the glomerule. The convoluting of the capillaries of the choroid plexuses of the ventricules of the brain are the only ones that approach these. It is quite pretty to trace the space between the glomerule and the capsule, into which the urine oozes continually. We must bear in mind that it is the whole capsule, space and glomeruli, that form the corpuscle which has immortalized the name of Malpighi. We may look in vain through the whole human body for anything that recalls such wonderful and beautiful arrangement. All these coils are to increase the excretory surface. In the kidney and the liver the Almighty Builder has truly shown brilliant conception and masterful handicraft.

The efferent vessel is another little poem in itself. We must note that it comes out of the capsule at the same point where the afferent vessel penetrates. It is also worthy of special notice that it is still an artery. Again, it is an exception also that it does not discharge immediately into the veins near by, but first breaks up into a set of capillaries. Now, this origin, cause and termination, is in thorough accord with a portal system. That is what it is, only it is an arterial one and a capillary one. All this is truly amazing in all its radiant beauty. Such another arterial capillary portal system is seen nowhere.

We have already mentioned the stars of Verheyn, which stand for the origin of the superficial capillary veins.

It is noteworthy that the kidneys, as large and important organs as they are, receive no separate and distinct nerve. Nor do the spleen, pancreas, lungs. That is a trait common to all the organs of vegetable life. The liver, receiving almost the whole of the right pneumogastric nerve, is the only apparent exception to this law. However, we should be impressed with the extent of the nervous supply of the kidney, because the filaments from the lumbo-aortic plexus are so very numerous, owing to the large size of the arteries which afford them ample supporting surface.

The kidneys develop in the lumbar region, but it is most peculiar that sometimes a kidney is found in the pelvic cavity, receiving its vascular supply from the neighboring vessels, showing that it has been developed there. Surgeons must think of this when they miss a kidney in the lumbar region and explore the pelvis. I cannot remember any other organ that will wander as far away in its original development.

It is of interest that the two kidneys sometimes join by their lower extremities in front of the lumbar region, constituting that rare and interesting anomaly called the horse-shoe kidney. This may have caused more or less unwelcomed surprises to some surgeons.

It is notable that the kidney belongs to that class of organs that are developed by lobes and lobules, each lobe being composed of a pyramid of Malpighi surrounded by cortical substance. It is to be remembered that in some of the lower animals the lobes remain separate and independent. The lobules themselves will do so. I was much interested when I read somewhere that in the lion and the bear, I think, the kidney resembles a bunch of grapes. In the human subject the lobes all finally coalesce, but it is very interesting that in babies and young children the surface of the kidney is nodulated. In the adult we must understand that a lobe is formed of a pyramid, surrounded by the central substance of the periphery and laterally by the half of the adjacent column of Bertin. Another fact not to be forgotten is that a lobule or pyramid of Ferrein is formed by the dichotomous divisions and sub-divisions of one single canalicule from the apex to the periphery, or surface of the kidney. Also that it is between these lobules, or pyramids of Ferrein, that the vessels take their course specially in the cortical portion, where it is notable they are much more numerous and larger than in the medullary.

In the development of the kidney, it is significant that sometimes there are two or three smaller renal arteries and veins instead of a single large artery or vein.